At the outset, it should be noted that by this amendment, a new set of Claims 29-42 have been substituted for the claims of record so as to resolve the 112 rejections and so as to better define the novel features of the invention and the distinctions thereof over the art cited by the Examiner. In particular, a new main Claim 29 has been added to the application, which more particularly highlights the novel features of the invention as described in greater detail hereinafter. Two new Claims 30 and 31 have also been added to the application which specifically highlight the orientation of the cells as shown in Figures 2-4 and as described on page 8, first full paragraph. Claims 32-42 correspond directly to former Claims 19, 20 and 22-26, respectively, with Claims 38 and 39 referring to the two alternate embodiments of former Claim 23.

In light of the above, it is believed that the 112 rejection of former Claims 24 and 26 relative to the use of the symbols "(tg)" has been resolved. With respect to the 112 objection to the specification and the rejection of Claims 21, 24 and 26 based thereon, initially it should be noted that reference in former Claim 21 to the radiation absorbing layer being one piece has been cancelled from the claims.

With respect to the Examiner's objection to the description of angles added to line 12 on page 7 of the specification, and to former Claims 24 and 26 (i.e., now Claims

40 and 42) which define Mattsson angles, the Examiner indicates that the Mattsson reference defines the partition angles with respect to the direction of motion of the grid and not with respect to the side of the grid as set forth in these claims and these amendments. It should be noted that according to the invention as clearly set forth in the original disclosure at page 7, lines 8-12, the angles of inclination of the sides of the cells with respect to the side of the grid which is parallel to the direction of movement of the grid are determined in accordance with the formulas of Mattsson. The Mattsson angles indeed refer to angles relative to the direction of movement, and in applicant's invention, the direction of movement is, in turn, parallel to the longitudinal side of the grid. As a practical result, unlike Mattsson, the grid is not moved at an oblique angle relative to the longitudinal side of grid but is moved parallel to the longitudinal side, i.e., with the angle of inclination of the sides of the cells under the angle of Mattsson being relative to the direction of movement which in the present invention, is the same as the direction or orientation of the longitudinal side of the grid.

For the Examiner's consideration, attached as Exhibit 1 is a copy of a comparison of the Mattsson's design of grid relative to the design of the grid by the present invention. As the Examiner will note, the angles and formulas remain the same, and only the frame of reference has been changes relative

thereto. The specification and claims have been amended to reflect this fact.

More particularly, the present invention eliminates the shadow pattern of the grid by using the same Mattsson angles but along a different line of reference -- rather than having the sides of the cells and the grid itself and the longitudinal sides of the cell being parallel, the shadow pattern is removed by having the cell pattern of the grid oriented under the Mattsson angles to the direction of the motion of the grid, and, in turn, the longitudinal side of the grid which is parallel to direction of its motion. As a practical matter, this means that the grid will continue to move parallel along the table with the patient and not away from it, as would be required by Mattsson's design. Basically, Mattsson designed his angles for motion of the grid at an angle to its longitudinal side and the present invention modifies the frame of reference by orienting the sides of the cells with the intended direction of motion. As indicated above, the orientation of the cell sides to the direction of motion remains the same in accordance with the Mattsson angles. One significant and patentable distinction is that the present invention accommodates the practical application of moving the grid along the length of a patient and not at an angle thereto, by orienting or changing the frame of reference of grid movement relative to the orientation of the cells. Accordingly, it is

believed that the specification is enabling for use of the Mattsson angles in the manner as now defined.

Turning now the prior art 102 and 103 rejections, at the outset, it should be noted that new Claim 29 has been added to provide terminology for the various parts which is more aptly applied in the trade. New Claim 29 specifically defines a cellular X-ray grid for use in an X-ray imaging system with a radiation point source and an X-ray film which includes both a cellular X-ray grid and means also for moving the grid in a predetermined rectilinear direction, as described in the specification and illustrated in the drawings. As will be described in greater detail hereinafter, the art cited by the Examiner merely represents the state of the art to which applicant has addressed himself, and it is respectfully submitted that none of the patents, either applied alone or in combination, disclose or suggest the invention as now claimed.

Turning now, in particular, to the Examiner's reliance on Albert and Caldwell, attached hereto as Exhibit 2 is a graphic and schematic comparison which clearly shows the differences between the grid of the present invention and the grids of these two references. As noted therein, in accordance with Albert, the sides of the cells are parallel, and there is no movement of the collimator. In Caldwell, there is a diagonal orientation (45°) of the cells walls to the side which is parallel to the direction

of motion of grid. In contrast thereto, with the present invention, there is a non-diagonal, non-parallel and non-perpendicular orientation of the cells preferably under the angle of Mattsson relative to the side which is parallel to the direction of movement of the grid. This distinction affords significant improvements and results, as previously pointed out to the Examiner.

More particularly, it can be seen that the Albert grid is not a monolithic (i.e. one piece) structure but instead a multi-layer structure which contains different alternate perforated and non-perforated layers. The drawings in particular define a one-piece main part, support for which can be found in the specification as well as the drawing. Moreover, Albert is not composed of photosensitive glass or any other photosensitive material, as also now claimed. Instead it is composed, for example, in one alternative, of X-ray absorbing materials such as lead, tin, lead-containing or uranium-containing glass which has etched openings as disclosed in column 7, lines 27-60. In accordance with another alternative, it can be composed of light metals such as copper or barium-copper with etched openings and subsequently applied X-ray absorbing layer on the surfaces of the etched plate, for example, lead layer as disclosed in column 14, lines 18-30. Still another alternative includes the device composed of light metals, or plastics which surface layers of the above-mentioned metals and with etched openings, which lead layer

covering its surfaces partially as disclosed in column 14, lines 35-60. All three alternatives of the device disclosed in the patent to Albert are produced by applying a thin photosensitive layer with a thickness of nm or in other words photoresist, on the surface of the main material, then exposing the same with light through a mask, then developing an etching through the exposed part of the photoresist so as to produce openings, through which thereafter analogous openings in the main material are made. Since the etching is performed with the same speed in direction of the depth and width, only very thin layers with a thickness of several tenths of micrometers can be treated in this way, since otherwise the partitions will be etched out as well. Thereby, the grid disclosed in the patent to Albert is composite and composed of many layers in direction of its height. For example, if it is necessary to produce the grid with a thickness of minimum 2 mm, it will contain several hundredths of micron layers.

In contrast, when the grid is composed of a photosensitive glass as in the applicant's invention, it is made of a monolithic grid. In such a monolithic structure of photosensitive glass etching is performed through the whole depth of the structure since the irradiated or exposed portions corresponding to the openings are etched without etching of their walls. The monolithic grid produced from the photosensitive glass is characterized by substantially higher manufacturing

accuracy which improves the quality of X-ray diagnostics. Its manufacture is a many hundredths times faster than the manufacture of the composite grid. It permits to provide X-ray diagnostics or treatment of substantially irradiation doses for patients and personnel. It should be noted that the cellular grid disclosed in the patent to Albert has not been implemented in practice and exists only in corresponding articles and this patent. The grid disclosed in the reference is not composed of photosensitive glass or any other photosensitive material. Furthermore, as previously indicated, the applicant's invention provides for highly advantageous results which cannot be obtained from the Albert patent.

With respect to the Examiner's reliance on Millenaar, it can be seen in this reference that while Millenaar covers slots in his linear grid, they are not hermetically sealed as inherently necessary for covering cells which contain gas in a cellular grid and which should be capable of transmitting long waves of X-ray radiation, as presently claimed.

Turning now to the Examiner's reliance on Caldwell, it can be seen that in this reference, the grid is arcuate, i.e., in its cross-section it has the shape of the part of a circle with its center in the target, as can be seen in the attached Exhibit 3, Figure A. In contrast, as defined in the claims, a grid in accordance with the applicant's invention is planar, as shown in

the drawings and as shown in attached Figure B. As a result, with the grid of applicant's invention, the patient can be located a very small distance from the grid, usually 10-15mm, while in the reference, it cannot be shorter than 46mm (the object must always be above the grid). With the focal distance of 1,000mm, the geometrical sharpness for the grid in accordance with the present invention is

$$N_1 = \frac{2.5 \times 15}{1000 - 15} = .038\text{mm},$$

while for the grid in accordance with the reference, it is

$$N_2 = \frac{2.5 \times 41}{1000 - 46} = .12\text{mm}.$$

It can be seen that the geometrical out-of-sharpness of the grid in accordance with the present invention is practically not recognizable, it is only 38mkm, while it dramatically increases for the operation with the grid in accordance with the references and the information about the objects with L_1 less than 15mm is completely lost. This is simply unacceptable in modern diagnostics.

Furthermore, the presently claimed invention requires that the grid move in a rectilinear direction parallel to its longitudinal side. In contrast, the grid in the reference in the

cross-section moves along a circle, which does not afford as sharp a picture as the present invention.

In the reference, the square or rectangular cells move along their diagonals, so that during the exposure time one or more cells have to pass, with the preferable square shape and the movement at the angle of 45° as shown in Figure C. In contrast, in the applicant's invention, the cells in the shape of square or parallelograms can be located relative to the side which is parallel to the direction of movement at the angles calculated in accordance with the Mattsson formulas, as shown in Figure D. As a result, with the grid of the reference, the images of the sides of, for example, square cells will be erased, while the images of the apexes of the squares will not be erased since during the movement, they will be superimposed over one another and will not transmit radiation, and to form of the visible lines on the image of an object, as can be seen in Figure E. In contrast, when the grid is designed in accordance with the applicant's invention the image of an object will be free from the images of the lines on the image of an object, as can be seen from Figure F.

Furthermore, in the device of Caldwell, the screen members are composed of lead which absorbs X-ray radiation and are connected with a supporting frame 28. The members or strip of lead are thick and high since lead is very soft, and the grid with thin strips will be deformed. The thick strips and the

thick grid worsen the image and increase the radiation dose. The cells are filled with a hard, supporting material to prevent bending of the strips, such as bacelite, condencite, celluloid, see page 4, lines 70-75, and Figure 3.

In contrast, in the applicant's invention, the grid itself (its main portion) is composed from a hard and X-ray transmitting material, which however is covered over all its surfaces with an X-ray absorbing material, so that a hard monolithic system is formed, and the cells are preferably filled with gas (air) or vacuumed and no supporting material inside the cells is needed. This allows passage through the grid of soft radiation which carries information about hard-to-detect objects and therefore diagnostics of early pathology with higher chances for its curing.

Moreover, the secondary references cited by the Examiner do not cure any of the basic deficiencies of the primary references. Indeed, as the Examiner well knows, it is improper to combine references unless there is some suggestion in their teachings for doing so. This is clearly lacking here necessarily causing the asserted combination to fail in rendering the claimed invention obvious.